Road Geometry and Driver Behavior Influence Vehicle Crossing of A Roadway Centre-line

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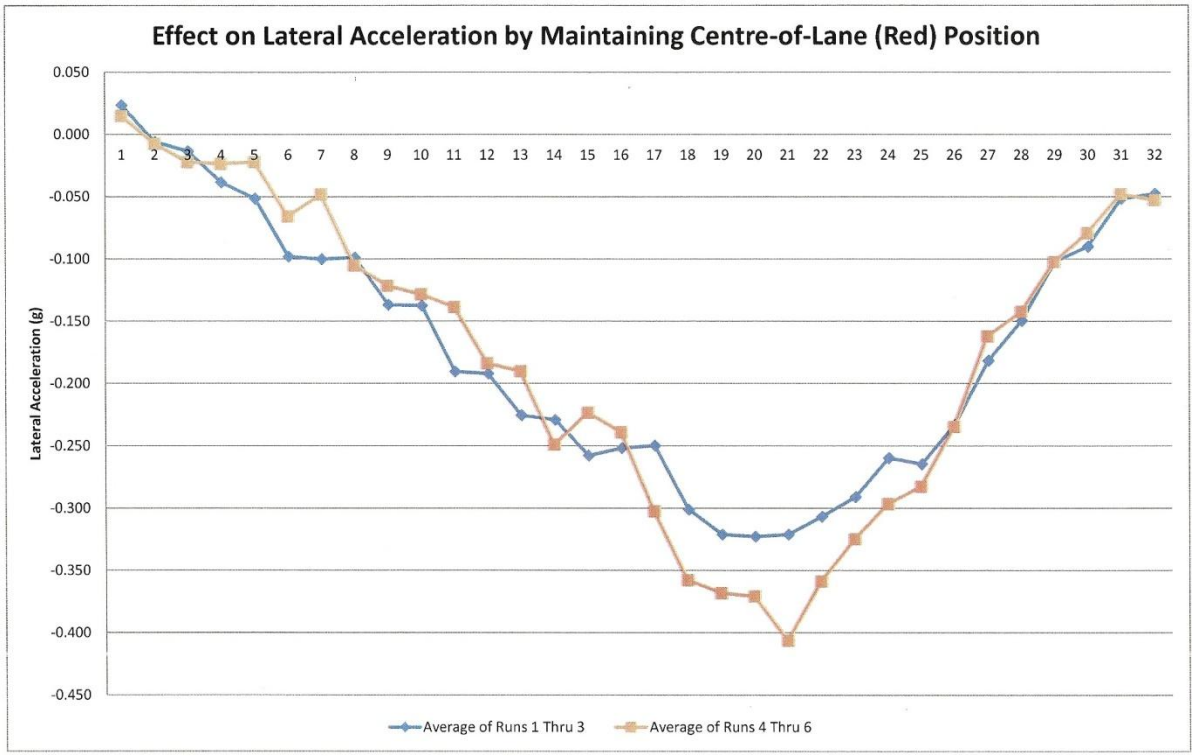
Gorski Consulting has been involved in many years of research delving into how and why vehicles are involved in loss-of-control collisions. A common factor involves how drivers negotiate curves on rural roadways. Al though there are many influences, the study of the geometry of a curve as well as how drivers negotiate it can help to demonstrate why collisions may occur at some curves.

As an example, the figure below shows a vehicle travelling completely on the wrong side of the road while travelling around a curve. An extended time of videotaping revealed that a high percentage of vehicles were crossing the centre-line at this particular site. An instrumented test vehicle provides some clues as why this was occurring.

The road in question was signed with a maximum posted speed of 80 km/h. The curve a itself was posted with an advisory speed of 60 km/h. Yet the average speed of vehicles entering the curve was 79 km/h and exiting at 75 km/h; both well above the advised speed.

A test vehicle, with cruise control set at 70 km/h provided the following lateral acceleration values:



The blue line represents the average acceleration from three tests where the test driver simply followed the normal procedure for passing through the curve by steering close to the centre-line near the beginning and then allowing the vehicle to drift toward the outside (right) portion of the lane in the latter part of the curve. As seen in the table the maximum lateral acceleration of over 0.3 g was substantial.

The red line represents the average acceleration from three tests where the test driver purposely attempted to keep the vehicle squarely in the centre of the lane through the curve. The results show that the maximum lateral acceleration was over 0.4g in these latter tests.

Comparing the two lines, the obvious difference is that, using the width of the lane to pass through the curve allowed drivers to travel at a higher speed while reducing the lateral acceleration. If they had simply stayed in the middle of the lane their maximum acceleration would be higher and they would be in greater jeopardy of sliding out and losing control of the vehicle.

But as shown in the photo above, some drivers have taken this use of the road to extremes. Drivers did not want to reduce their speed on this rural highway to an advised speed of 60 km/h and they were willing to accept fairly large lateral forces to be able to travel at the higher speed. The discomfort of this high lateral force was demonstrated when opposing traffic was not in sight and drivers preferred to simply use the full width of the road to reduce that lateral force.

A problem occurs when drivers develop a habit of crossing into the opposing lane but on occasion they meet an opposing vehicle that prevents that action. Then they must stay within their lane and suffer the higher lateral force. In many instances this results in no consequence but on a few occasions this causes some vehicles to travel off the right asphalt edge. Travel off the paved surface often has no consequence however, infrequently, it can cause a vehicle to rotate out of control and crash.

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